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(54) Title: METHOD AND APPARATUS FOR INSERTING BLANKS TO BE THREADED IN AUTOMATIC ROTARY ROLLING MACHINES

(57) Abstract: A method for inserting blanks to be threaded in automatic rotary rolling machines, in which the step for inserting the parts to be machined in the working position occurs at an adjustable optimized rate, so that the portions of the outer surface of the roller tool affected by contact with the parts that have just been inserted vary continuously at each turn of the spindle. This allows to reduce significantly the surface wear of the roller too, extending its life likewise. The invention also relates to an automatic rotary rolling machine.

WO 2004/007110 A1

METHOD AND APPARATUS FOR INSERTING BLANKS TO BE THREADED IN AUTOMATIC ROTARY ROLLING MACHINES

The present invention relates to a method and to an apparatus for inserting blanks to be threaded in automatic rotary rolling machines.

Rolling machines for forming screws are known in which the thread is generated by cold rolling.

Among these, rotary rolling machines, in which the blank to be machined is rolled by virtue of a system of threaded rollers, are widely used.

In particular, one type of rolling machine is the roller and sector rotary type, in which there is a single roller tool and the part is rolled under pressure between the tool and a semicircular guide.

These kinds of machine usually include an automatic device for inserting the parts in the working position, which is actuated by a kinematic system, generally of the cam type, connected to the tool supporting spindle.

Usually, the tool supporting roller has a number of thread starts that varies between 10 and 60, depending on its diameter and on the diameter of the screw to be formed.

The cam of the kinematic system connected to the spindle must be sized so that the insertion of a part occurs at one of the starts of the roller tool.

Accordingly, the number of parts inserted at each turn of the spindle is a submultiple of the number of starts of the roller.

This entails that with this kind of insertion device, which is automated in a rigid manner, at each turn the parts are always inserted at the same starts of the roller, causing increased wear of the corresponding portions of the outer surface of the roller.

The consequence of this is an uneven wear of the threaded outer surface of the roller, which entails a reduction in the life of the tool.

An aim of the present invention is to provide a method and an apparatus for inserting blanks to be threaded in automatic rotary rolling machines that overcome the drawbacks of the cited prior art.

An object of the invention is to provide a method and an apparatus that allow

perfectly uniform wear of the machining surface of the tool.

A further object of the invention is to provide a method and an apparatus that ensure a significant increase in the life of the tool.

A further object of the invention is to provide a method and an apparatus that allow to adjust more flexibly the number of parts inserted at each turn of the spindle.

A further object is to provide a method and an apparatus wherein the steps for the insertion of the part in the working position are simplified.

A further object of the invention is to provide a method and an apparatus that allow to obtain finished products of higher quality than conventional methods.

This aim and these and other objects that will become better apparent hereinafter are achieved by a method for inserting blanks to be threaded in automatic rotary rolling machines, as claimed in the appended claims.

This aim and these and other objects that will become better apparent hereinafter are also achieved by an apparatus as claimed in the appended claims.

Further characteristics and advantages will become better apparent from the description of preferred but not exclusive embodiments of the invention.

The method for inserting blanks to be threaded in automatic rotary rolling machines can be applied to an automatic rotary rolling machine of the roller and sector type.

The machine includes a roller tool and a semicircular fixed guide, commonly termed sector, on which the part to be threaded is made to roll under pressure during rolling.

The blanks to be machined arrive from a feeder guide and are arranged in contact with the roller in a working position, preferably by virtue of an automated insertion device.

The insertion device inserts the parts in the working position, applying the insertion method according to the invention.

The insertion step consists in inserting in the working position a certain number of parts at each turn of the spindle on which the roller tool is mounted, so that they are machined by rolling.

The part pressed against the outer threaded surface of the roller undergoes a

permanent plastic deformation that forces it to assume the shape of the thread.

As soon as the part is inserted in the working position and begins to be machined, it makes contact with the roller at a portion of the outer surface of the roller together with an inner portion of the sector.

The next part that is inserted makes contact with the roller at a subsequent portion of its outer surface that is arranged at a certain angular distance from the first portion.

The particularity of the method according to the invention is that the part insertion step occurs at a rate that is optimized and adjustable, so that the portions of the surface of the roller that are successively in contact, in the working position, with the parts inserted in a full turn of the spindle do not coincide with the portions engaged in the following turn.

Part insertion is adjusted by using an apparatus that is constituted by a base body that is rigidly coupled to the frame of the machine and is adapted to support a reciprocating member that is actuated for example by a linear motor.

The reciprocating member has a transverse guide, to which an insertion punch or pusher is applied; its position on the transverse guide is adjustable and is set for example by means of a screw system.

The linear motor is controlled electronically and the system therefore allows fully automatic adjustment.

It should be noted that each one of the portions of the outer surface of the roller that engages in each instance the parts during the insertion step corresponds to one of the starts of the outer thread of the roller.

With the described method, therefore, the starts of the thread of the roller that make contact with the parts upon insertion in a full turn of the spindle differ from the ones in contact in the next turn.

In practice it has been found that the invention achieves the intended aim and objects, a method having been provided for inserting blanks to be threaded in automatic rotary rolling machines that allows to improve the functionality of this kind of machine.

It is in fact evident that the described method allows to provide uniform tool wear, extending its life accordingly.

Another advantage of the described method arises from a greater size constancy of the threads of the screws, with a consequent improvement in the quality of the product.

The method and the apparatus according to the invention are susceptible of numerous modifications and variations, within the scope of the appended claims. All the details may be replaced with technically equivalent elements.

The materials used, as well as the dimensions, may of course be any according to requirements and to the state of the art.

CLAIMS

1. A method for inserting blanks to be threaded in automatic rotary rolling machines, comprising an insertion step, which consists in inserting in a working position a certain number of parts at each turn of the spindle in order to machine them by rolling with at least one roller tool, during the insertion step each inserted part engaging the roller at a portion of the outer surface of said roller, said method being characterized in that the part insertion step occurs at such a rate that the portions of the outer surface of the roller tool that engages the inserted parts in the working position vary continuously at each turn of the spindle.

2. The method according to claim 1, characterized in that said roller tool is an externally threaded roller whose thread has a certain number of starts, and in that during the insertion step each outer portion of the surface of the rollers that engages in the active position each inserted part corresponds to one of said starts.

3. The method according to claim 2, characterized in that at each turn of the spindle the starts of the roller that engage in the active position with the parts inserted in that turn differ from the ones that engage in the following turn.

4. The method according to claim 1, characterized in that the step of insertion with an optimized adjustable rate is provided by virtue of an electronically operated insertion device.

5. An automatic rotary rolling machine, comprising at least one roller tool, at least one guide for feeding the parts to be machined, and an apparatus for picking the parts from said guide and inserting them in an active position, characterized in that said apparatus comprises a reciprocating member that is provided with a means suitable to pick a part to be machined from a guide and insert it in a working position, said reciprocating member being actuated by an electronically controlled linear motor, said insertion device being suitable to insert the parts to be machined at an adjustable rate, so that the portions of the outer surface of said roller tool that engage the parts inserted in the working position are changed continuously at each turn of the spindle.

6. An apparatus for an automatic rotary rolling machine, comprising a reciprocating member that is provided with a means for picking a part to be machined

from a guide and for inserting it in an active position, characterized in that said reciprocating member is actuated by a linear motor that is controlled electronically and is suitable to insert, in an active position, a certain number of parts at each turn of the spindle in order to machine them by rolling with at least one roller tool; during the insertion step, each inserted part engaging the roller at a portion of the outer surface of said roller, the part insertion step occurring at such a rate that the portions of the outer surface of the roller tool that engage the parts inserted in the working position are changed continuously at each turn of the spindle.

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A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 B21H9/02

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 B21H

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal, PAJ, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X A	US 3 733 867 A (PRUTTON E) 22 May 1973 (1973-05-22) column 1, line 4 - column 5, line 66; figure 1 -----	1-3 5
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[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

° Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

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Name and mailing address of the ISA	Authorized officer
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C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

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Information on patent family members

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